

NON-PUBLIC?: N  
ACCESSION #: 9408030162  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Salem Generating Station - Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000311

TITLE: Reactor Trip Due To 23 Steam Generator Lo-Lo Level During  
Return To On-Line Power Operation  
EVENT DATE: 06/29/94 LER #: 94-008-00 REPORT DATE: 07/27/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 006

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: M. J. Pastva, Jr. - LER Coordinator TELEPHONE: (609) 339-5165

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At 0439 hours on 6/29/94, an automatic Reactor Protection System trip from 14% power occurred due to 23 Steam Generator (SG) lo-lo level, resulting from the tripping of 21 SG Feed Pump (SGFP), caused by 22 SG hi-hi level. Emergency operating procedures were entered and the Unit was stabilized in Mode 3. This event is attributed to the design of the feedwater control system, which exhibits sensitivity at low power levels, that was strongly affected by normal closing of the 21 SGFP recirculation valve, 21BF32. When 21BF32 closed, a greater level increase occurred in 22 SG than in the other SGs. Operability checks and troubleshooting verified proper SG level control response. To eliminate the effect of BF32 closure upon SG level control during Startup, procedure revisions on both Units have been implemented which ensure the valves remain open during Startup. To provide additional margin of SG level control to better cope with feedwater control system transients during Startup and

at low power, a license change request will be submitted in order to lower the current SG lo-lo setpoint of 16% to less than 10%. Design changes, currently scheduled for installation on Unit 1 during 1R12 and on Unit 2 during 2R9, utilize digital equipment technology that will reduce the exhibited sensitivity of the feedwater control system at low power levels.

END OF ABSTRACT

ATTACHMENT TO 9408030162 PAGE 1 OF 2

Table "REQUIRED NUMBER OF DIGITS/CHARACTERS FOR EACH BLOCK" omitted.

TEXT PAGE 2 OF 4

#### PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as {xx}

#### IDENTIFICATION OF OCCURRENCE:

Reactor Trip Due To 23 Steam Generator Lo-Lo Level During Return To On-Line Power Operation

Event Date: 6/29/94

Report Date: 7/27/94

This report was initiated by Incident Report No. 94-182.

#### CONDITIONS PRIOR TO OCCURRENCE:

Mode 1 Reactor Power 6% Unit Load -0- MWe

On June 25, 1994, the Unit was in MODE 2 while dredging the Circulating Water (CW) {UA} intake structure in response to seasonal problems with excessive Delaware River marsh grass/debris.

Ascension to on-line operation began and the Unit entered Mode 1 at 0320 hours on June 29, 1994.

#### DESCRIPTION OF OCCURRENCE:

At 0439 hours on June 29, 1994, an automatic Reactor Protection System (RPS) {JC} trip occurred due to 23 Steam Generator (SG) lo-lo level resulting from the tripping of 21 Steam Generator Feed Pump (SGFP). Emergency Operating Procedure (EOP)-TRIP-1, "Reactor Trip Or Safety Injection" and EOP-TRIP-2, "Reactor Trip Response" were entered and at 0441 hours (same day) Main Steam was isolated to limit cooldown of the Reactor Coolant System (RCS). The Unit was stabilized in Mode 3 and Integrated operating Procedure (IOP)-8, "Maintaining Hot Standby", was entered.

At 0533 hours (same day) the NRC was notified of this event, in accordance with 10CFR50.72(b)(2)(ii).

#### ANALYSIS OF OCCURRENCE:

The RPS SG lo-lo level reactor trip prevents operation with SG water level below the minimum required for adequate heat removal. The setpoint ensures adequate SG inventory to allow for possible

#### TEXT PAGE 3 OF 4

Auxiliary Feedwater Pump starting delays; thus preventing SG dryout and RCS thermal and hydraulic transients associated with a loss of the heat sink.

While at approximately 14% reactor power, 21 SGFP was in service and 21 and 22 Auxiliary Feed Pumps were in service on recirculation. 22 SGFP was cleared and tagged. Level control problems with 21 Steam Generator (SG) were encountered due to sluggish response of the SG feedwater regulating valves 21BF40 and 21BF19 in automatic. Manual control of the 21 SG valves was taken to stabilize SG level. 22 SG BF19 appeared to be controlling satisfactorily, as evidenced by Control Room strip charts. Following speed adjustments to 21 SGFP, the pump recirculation valve, 21BF32, cycled closed, twice. 21BF32 closure resulted in increased feedwater flow to the SGs. which affected the level in 22 SG more than in the other SGs. Level in 22 SG increased to the hi-hi setpoint (67%) causing a feedwater isolation which tripped 21 SGFP (per design). This resulted in decreasing SG levels and reactor power was reduced and auxiliary feedwater flow was initiated to regain normal SG levels. However, 23 SG lo-lo level (16%) occurred causing the reactor trip. Operator action was in accordance with existing procedural requirements.

Following the reactor trip, excessive RCS cooldown occurred, attributed to automatic starting of 23 Auxiliary Feedwater Pump

(Main Steam turbine-driven). This occurred due to subsequent lo-lo level in 24 SG, coincident with the lo-lo level in 23 SG. As the result of prior excessive RCS cooldowns following reactor trips (e.g., Unit 1 LER 272/93-002-00, 272/94-005-00, 272/94-007-00, 272/94-009-00, and Unit 2 LER 311/92-009-00), design change packages have been implemented on Unit 1 and are scheduled for implementation for Unit 2. Engineering is assessing additional potential corrective actions. In addition, EOP-TRIP-1 has been revised to provide specific direction on throttling auxiliary feedwater flow in order to prevent RCS cooldown resulting from excessive auxiliary feedwater flow.

#### APPARENT CAUSE OF OCCURRENCE:

This event is attributed to "Design, Manufacturing, Construction/ Installation", as classified in Appendix B of NUREG-1022. This results from the design of the feedwater control system, which exhibits sensitivity at low power levels, that was strongly affected by normal closing of 21BF32. Feedwater flow traces prior to and during the event showed that BF19 and BF40 of 22 SG were open more than the respective valves of 21, 23, and 24 SGs. When 21BF32 closed, a greater level increase occurred in 22 SG than in the other SGs. Troubleshooting, including 21BF32 as well as the SGs' BF19s and

TEXT PAGE 4 OF 4

#### APPARENT CAUSE OF OCCURRENCE: (cont'd)

BF40s, did not identify specific component failures attributed to this event.

#### PREVIOUS OCCURRENCES:

LER 311/89-006-00 reported an event, which was similar in that it involved SG level control at low power level. A Reactor trip signal occurred in Mode 3 as the result of 21 SG level fluctuations while the SG steamline steam flow channel I bistable was tripped for instrument calibration.

#### SAFETY SIGNIFICANCE:

This event is reportable pursuant to the requirements of 10CFR50.73(a)(2)(iv) and did not affect the health and safety of the public. The Reactor Protection System (RPS) {JC} functioned, as designed, and the heat sink was maintained. During this event, RCS

cooldown requiring main steam line isolation occurred, which has been experienced during other reactor trips (see ANALYSES OF OCCURRENCE: section).

CORRECTIVE ACTIONS:

Operability checks and troubleshooting of SG level control, including the BF19s and BF40s, verified proper response.

In order to eliminate the effect of BF32 closure upon SG level control during Startup, procedure revisions on both Units have been implemented which ensure the valves remain open during Startup.

To provide additional margin of SG level control to better cope with feedwater control system transients during Startup and at low power, a license change request will be submitted in order to lower the current SG lo-lo setpoint of 16% to less than 10%.

Design changes to the feedwater control system, currently scheduled for installation on Unit 1 during 1R12 and on Unit 2 during 2R9, utilize digital equipment technology that will reduce the exhibited sensitivity of the system at low power levels.

General Manager -  
Salem Operations

MJPJ:pc  
SORC Mtg. 94-061

ATTACHMENT TO 9408030162 PAGE 2 OF 2

PSE&G

Public Service Electric and Gas Company  
P. O. Box 236 Hancocks Bridge, New Jersey 08038

Salem Generating Station

July 27, 1994

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Dear Sir:

SALEM GENERATING STATION  
LICENSE NO. DPR-75  
DOCKET NO. 50-311  
UNIT NO. 2

LICENSEE EVENT REPORT 94-008-00

This Licensee Event Report is being submitted pursuant to the requirements of Code of Federal Regulation 10CFR50.73(a)(2)(i)(iv). Issuance of this report is required within thirty (30) days of event discovery.

Sincerely yours,

J. J. Hagan  
General Manager -  
Salem Operations

MJPJ:pc

Distribution

The Power is in your hands

\*\*\* END OF DOCUMENT \*\*\*

---